Application No. 09/599,963
November 9, 2004
Reply to office action of August 9, 2004

Amendments to the Specification

Please amend the paragraph beginning on page 2, at line 24, and ending on page 3, at line 16 as follows:

> The present invention includes methods which determines network performance by determining not only the transit delay between nodes in a network but also the variance, or jitter, of such transit delays. A common node, usually a network management computer (NMC), sends out a signal to a first node of interest and measures the time before it receives an acknowledgment from the first node. The NMC then sends out a similar signal to a second node of interest and similarly measures the time required to receive an acknowledgment. Based on these two measurements, the transit delay between the first and second nodes can be calculated if the first node lies on the path between the NMC and the second node or vice versa. For a multiple node communications path, the total transit delay between any two nodes is the sum total of the transit delays between adjacent nodes lying on the path. The method also determines the processing overhead delay of a communication path between any two adjacent nodes by subtracting a previously recorded minimum transit delay for the communication path with the current interim transit delay. It follows that the total processing overhead time for a multiple node path would be the sum of the processing overhead delays for each path. ~~In the case of meshed networks, where a path to a node may be ambiguous, additional measurement nodes strategically positioned in the network can be used such a way that the transit delay between any adjacent pair of nodes can be calculated unambiguously from at least one of these measurement nodes, i.e., the portion of the network being measured will be reduced to a hierarchical one with respect to at least one of the measurement nodes.~~

Please add a new paragraph on page 3 prior to line 17 as follows:

In the case of meshed networks, where a path to a node may be ambiguous, additional measurement nodes strategically positioned in the network can be used in such a way that the transit delay between any adjacent pair of nodes can be calculated unambiguously from at least one of these measurement nodes, i.e., the portion of the network being measured will be reduced to a hierarchical one with respect to at least one of the measurement nodes.

Please amend the paragraph on page 7, beginning at line 4 as follows:

In an eighth embodiment the invention provides a method of determining a total processing overhead delay between a start node and an end node in a network, the method comprising: a) determining interim processing overhead delays between adjacent nodes in a communications path between the start node and the end node including the following steps: a1) sending a first signal from a common node to the first node; a2) receiving a first response signal at the common node from the first node in response to the first signal; a3) determining a first round trip time, the first round trip time being a time elapsed between steps a1) and a2); a4) sending a second signal from the common node to the second node; a5) receiving a second response signal at the common node from the second node in response to the second signal; a6) determining a second round trip time, the second round trip time being a time elapsed between steps a4) and a5); and a7) calculating the transit delay between the first node and the second node according to the formula $D(X,Y)= | R(NMC,X)-R(NMC,Y) | /2$ where D(X,Y) is the transit delay between first node X and second node Y; R(NMC,X) is the first round trip time; R(NMC,Y) is the second round trip time; and NMC is the common node; wherein the first node and the second node are adjacent nodes; a7) subtracting a previously determined minimum transit delay between the first node and the second node with the transit delay between the first node and the second node; and b) calculating the total overhead processing delay between the start node and the end node by adding up the interim processing overhead delays.

Please amend the paragraph on page 11, beginning at line 3 as follows:

In cases where the processing time at a node is appreciable, it is assumed that this time is a constant and is adjusted for in delay calculations concerning that node. The round trip delay of the signal sent from the common node to adjacent nodes is a portion of the time taken at the nodes to respond to the query. The time taken by adjacent nodes may include the time the data waits in the queue of a device at the node before being transmitted and the time to process the data at the other end after being received. Thus, the total time taken for adjacent nodes to respond to the query is referred to as the processing overhead time. We outline below one way of determining this processing overhead time:

Please add the following paragraph on page 11, at line 21 as follows:

Referring again to Figure 3, there may be multiple paths available for signal routing between a start node and an end node. As one object of the present invention is to determine the processing overhead time for a given communication path, present invention can circumvent any ambiguities in the topology of the network prior to querying the nodes along the communication path. Alternatively put, multiple queries, or pings, are sent from the common node to the first node, from the common node to the second node and so on and so forth to the end node, prior to determining the specific topology of that communication path. The communication path is taken into account after the queries are sent. Thus, the method of the present invention differs significantly from the prior art, as disclosed in U.S.P.N. 5,563,875, wherein pre-calculated routes are required to send "wrap-around" test messages to each node in the pre-calculated route.